MITSUBISHI MOTOR SALES OF AMERICA, Inc.

TECHNICAL SERVICE BULLETIN

SUBJECT: **V-6 CRANKSHAFT BEARING SIZE — SERVICE MANUAL UPDATE**

NO.	TSB-91-11-001
DATE	February, 1991
MODEL	1988-90 V-6 Montero, Sigma

TSB Revision TSB-91-11-001

PURPOSE

V-6 engines manufactured since 1988 incorporate an improved crankshaft design. This design change consists of an undercut fillet at the ends of the crankshaft journals, which increases the strength of the rod and main bearing journals, thereby increasing the durability of the crankshaft. Crankshaft machining is not recommended for these crankshafts since any grinding will alter the internal radius and reduce the strength of the crankshaft.

Since crankshaft machining is no longer possible, references made in the affected service manuals must be deleted.

INSTRUCTIONS

Please delete or change text in the affected service manuals as shown on pages 2-7 of this bulletin, and, as reference to this TSB, please write this TSB number in the TSB Revision boxes on the affected service manual pages.

NOTE: In the 1989 and 1990 Montero Service Manuals the **"Taper of journal and pin"** specification has been revised from 0.05 mm (.002 in.) to 0.03 mm (.0012 in.).

AFFECTED SERVICE MANUALS

AFFECTED SERVICE MANUAL	PAGES AFFECTED
1988 Galant Σ	9-8, 9-9, 9-74, 9-78, 9-79
1989 Sigma V-6	9-6, 9-66, 9-71
1990 Sigma V-6	11-6, 11-62, 11-66
1989 Montero	9-60, 9-102, 9-106
1990 Montero	11-101

Continued... 023480

FILE UNDER: Group 11 Engine in the Dealer Service Information Binder (747)

CIRCULATE TO:
- ☐ GENERAL MANAGER
- ☐ PARTS MANAGER
- ☑ TECHNICIAN
- ☑ SERVICE ADVISOR
- ☑ SERVICE MANAGER
- ☐ WARRANTY PROCESSOR
- ☐ SALES MANAGER

1988 GALANT Σ, Page 9-8

Connecting rod bearing		
Oil clearance mm (in.)	0.016–0.046 (.0006–.0018)	0.1 (.004)
~~Undersize mm (in.)~~	~~0.25 (.010), 0.50 (.020), 0.75 (.030)~~ ← DELETED	
Crankshaft main bearing		
Oil clearance mm (in.)	0.02–0.048 (.0008–.0019)	0.1 (.004)
~~Undersize mm (in.)~~	~~0.25 (.010), 0.50 (.020), 0.75 (.030)~~ ← DELETED	

1988 GALANT Σ, Page 9-9

Items	Standard Value	Limit
Crankshaft		
Pin O.D. mm (in.)	49.980–50.000 (1.9677–1.9685)	
Journal O.D. mm (in.)	59.980–60.000 (2.3614–2.3622)	
Out-of-roundness of journal and pin mm (in.)	Less than 0.03 (.0012)	
Taper of journal and pin mm (in.)	Less than 0.005 (.0002)	
End play mm (in.)	0.05–0.25 (.0020–.0098)	0.3 (.012)
~~Undersize rework dimension of pin mm (in.)~~		
~~0.25 (.010) U.S.~~	~~49.735–49.750 (1.9581–1.9587)~~	
~~0.50 (.020) U.S.~~	~~49.485–49.500 (1.9482–1.9488)~~	
~~0.75 (.030) U.S.~~	~~49.235–49.250 (1.9384–1.9390)~~ ← DELETED	
~~Undersize rework dimension of journal mm (in.)~~		
~~0.25 (.010) U.S.~~	~~59.735–59.750 (2.3518–2.3524)~~	
~~0.50 (.020) U.S.~~	~~59.485–59.500 (2.3419–2.3425)~~	
~~0.75 (.030) U.S.~~	~~59.235–59.250 (2.3321–2.3327)~~	

Continued . . .

1989 SIGMA V-6, Page 9-6

Items	Standard value	Limit
Connecting rod bearing		
Oil clearance mm (in.)	0.016–0.046 (.0006–.0018)	0.1 (.004)
~~Service size mm (in.)~~	~~0.25 (.010), 0.50 (.020), 0.75 (.030) Undersize~~	← DELETED
Crankshaft main bearing		
Oil clearance mm (in.)	0.02–0.048 (.0008–.0019)	0.1 (.004)
~~Service size mm (in.)~~	~~0.25 (.010), 0.50 (.020), 0.75 (.030) Undersize~~	← DELETED
Crankshaft		
Pin O.D. mm (in.)	50 (1.97)	
Journal O.D. mm (in.)	60 (2.36)	
Out-of-roundness of journal and pin mm (in.)	Less than 0.03 (.0012)	
Taper of journal and pin mm (in.)	Less than 0.005 (.0002)	
End play mm (in.)	0.05–0.25 (.0020–.0098)	0.3 (.012)
~~Undersize rework dimension of pin mm (in.)~~		
~~0.25 (.010) U.S.~~	~~49.735–49.750 (1.9581–1.9587)~~	
~~0.50 (.020) U.S.~~	~~49.485–49.500 (1.9482–1.9488)~~	
~~0.75 (.030) U.S.~~	~~49.235–49.250 (1.9384–1.9390)~~	← DELETED
~~Undersize rework dimension of journal mm (in.)~~		
~~0.25 (.010) U.S.~~	~~59.735–59.750 (2.3518–2.3524)~~	
~~0.50 (.020) U.S.~~	~~59.485–59.500 (2.3419–2.3425)~~	
~~0.75 (.030) U.S.~~	~~59.235–59.250 (2.3321–2.3327)~~	

1989 MONTERO, Page 9-60

Connecting rod bearing		
Oil clearance mm (in.)	0.016–0.046 (.0006–.0018)	0.1 (.004)
~~Service size mm (in.)~~	~~0.25 (.010), 0.50 (.020), 0.75 (.030) Undersize~~	← DELETED
Crankshaft main bearing		
Oil clearance mm (in.)	0.02–0.048 (.0008–.0019)	0.1 (.004)
~~Service size mm (in.)~~	~~0.25 (.010), 0.50 (.020), 0.75 (.030) Undersize~~	← DELETED
Crankshaft		
Pin O.D. mm (in.)	49.9 (1.965)	
Journal O.D. mm (in.)	59.9 (2.358)	
Out-of-roundness of journal and pin mm (in.)	Less than 0.03 (.0012)	
Taper of journal and pin mm (in.)	Less than 0.005 (.0002)	
End play mm (in.)	0.05–0.25 (.0020–.0098)	0.3 (.012)
~~Undersize rework dimension of pin mm (in.)~~		
~~0.25 (.010) U.S.~~	~~49.735–49.750 (1.9581–1.9587)~~	
~~0.50 (.020) U.S.~~	~~49.485–49.500 (1.9482–1.9488)~~	
~~0.75 (.030) U.S.~~	~~49.235–49.250 (1.9384–1.9390)~~	← DELETED
~~Undersize rework dimension of journal mm (in.)~~		
~~0.25 (.010) U.S.~~	~~59.735–59.750 (2.3518–2.3524)~~	
~~0.50 (.020) U.S.~~	~~59.485–59.500 (2.3419–2.3425)~~	
~~0.75 (.030) U.S.~~	~~59.235–59.250 (2.3321–2.3327)~~	

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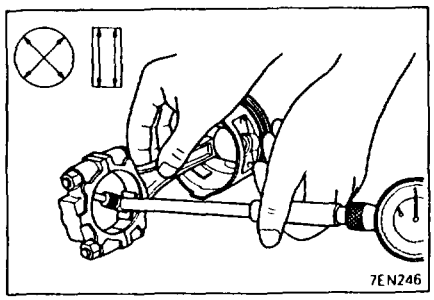
1990 SIGMA V6, Page 11-6

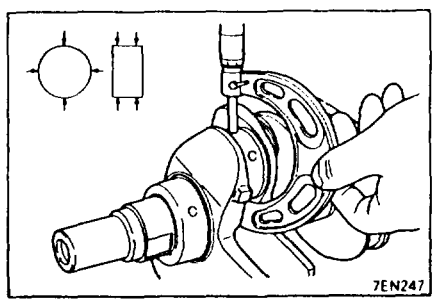
Items	Standard Value	Limit
Connecting rod		
Bend mm (in.)	0.05 (.0020) or less	
Twist mm (in.)	0.1 (.004) or less	
Connecting rod big end to crankshaft side clearance mm (in.)	0.10–0.25 (.0039–.0098)	0.4 (.016)
Piston pin press-in load N (lbs.)	7,500–17,500 (1,686–3,934)	
Connecting rod bearing		
Oil clearance mm (in.)	0.016–0.046 (.0006–.0018)	0.1 (.004)
Service size mm (in.)	0.25 (.010) Undersize ← DELETED	
Crankshaft main bearing		
Oil clearance mm (in.)	0.02–0.048 (.0008–.0019)	0.1 (.004)
Service size mm (in.)	0.25 (.010) Undersize ← DELETED	
Crankshaft		
Pin O.D. mm (in.)	49.9 (1.965)	
Journal O.D. mm (in.)	59.9 (2.358)	
Out-of-roundness of journal and pin mm (in.)	Less than 0.03 (.0012)	
Taper of journal and pin mm (in.)	Less than 0.005 (.0002)	
End play mm (in.)	0.05–0.25 (.0020–.0098)	0.3 (.012)
Undersize rework dimension of pin mm (in.)		
0.25 (.010) U.S.	49.735–49.750 (1.9581–1.9587) ← DELETED	
Undersize rework dimension of journal mm (in.)		
0.25 (.010) U.S.	59.735–59.750 (2.3518–2.3524)	

Continued . . .

1988 GALANT Σ, Page 9-74
1989 SIGMA V6, Page 9-66
1990 SIGMA V6, Page 11-62
1989 MONTERO, Page 9-102

AND, IF NECESSARY, REPLACE IT.


7EN246


7EN247

- **BEARING** N09TCD8

(1) Visually check the surface of the bearing. Replace those which are lopsided, streaked, damaged, or show signs of seizure. When streaks or seizure are excessive, check the crankshaft. ~~If damage is discovered on the crankshaft, either replace it or reuse it after undersize machining.~~

(2) Measure tha inner diameter of the connecting rod bearing and the outer diameter of the crankshaft pin. If the gap (oil clearance) exceeds the limit, replace the bearing, and, if necessary, the crankshaft. ~~or, undersize machine the crankshaft and replace the bearings with an appropriate undersized type.~~

Standard value: 0.016–0.046 mm (.0006–.0018 in.)
Limit: 0.1 mm (.004 in.)

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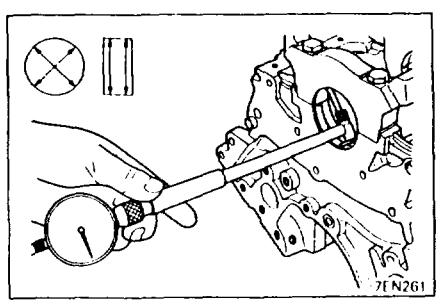
NOTE
For the method by which the oil clearance is measured using a plastigage, refer to the item on the crankshaft.

1988 GALANT Σ, Page 9-78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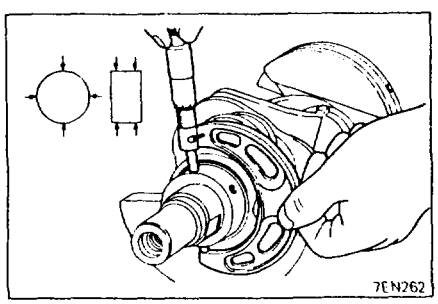
7EN262

- CRANKSHAFT N09UCCF

(1) Visually check the journal and pin areas and replace them if streak or seizure.

(2) Measure the outside diameter of the journal and the inside diameter of the bearing. If the clearance (oil clearnace) exceeds the limit, replace the main bearing, and also the crankshaft, if necessary. ~~Otherwise, fabricate an undersized crankshaft, and replace the main bearing with an under sized one.~~

Standard value :
0.020–0.048 mm (.0008–.0019 in.)
Limit : 0.1 mm (.004 in.)

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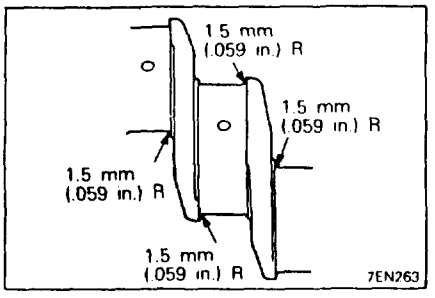
1988 GALANT Σ, Page 9-79
1989 SIGMA V6, Page 9-71



~~(3) When grinding the crankshaft to under-size, take note of the R dimensions of the fillets of the journal and pin area.~~

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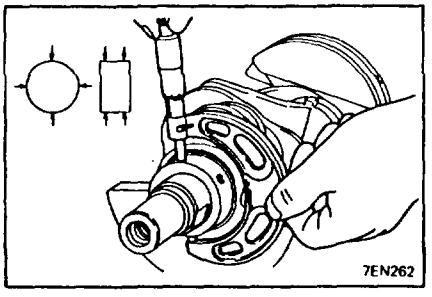
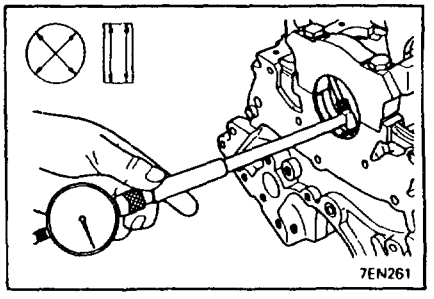
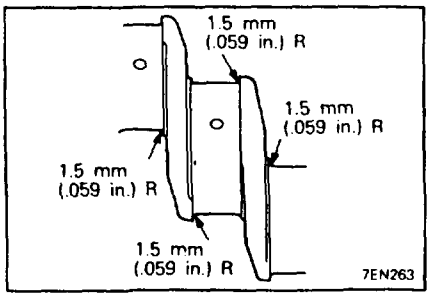
1989 MONTERO, Page 9-106







- **CRANKSHAFT**

(1) Check the crankshaft journals and pins for damage, uneven wear and cranks. Also check oil holes for clogging. Correct or replace any defective part.
(2) Inspect out-of-roundness and taper of crankshaft journal and pin.

Standard value
Crankshaft journal O.D. : 60 mm (2.36 in.) CORRECTED
Crank pin O.D. : 50 mm (1.97 in.)
Limit
Out-of-roundness of journal and pin : ~~0.03 mm (.0012 in.)~~ 0.005
Taper of journal and pin : ~~0.06 mm (.0002 in.)~~

(3) To check the oil clearance, measure the outside diameter of the crankshaft journal and the inside diameter of the bearing. The clearance can be obtained by calculating the difference between the measured outside and inside diameters.

Standard value
Crankshaft main bearing : 0.020–0.048 mm (.0008–.0019 in.)
Connecting rod bearing : 0.016–0.046 mm (.0006–.0018 in.)

Limit
Crankshaft main bearing : 0.1 mm (.004 in.)
Connecting rod bearing : 0.1 mm (.004 in.)

(4) If the oil clearance exceeds the limit, replace the main bearing (and also the crankshaft if necessary). Or in addition to undersizing the crankshaft, replace the main bearing with an undersized one.
(5) When grinding the crankshaft to under-size, take note of the R dimensions of the fillets of the journal and pin area.

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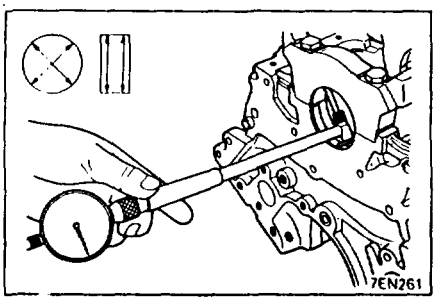
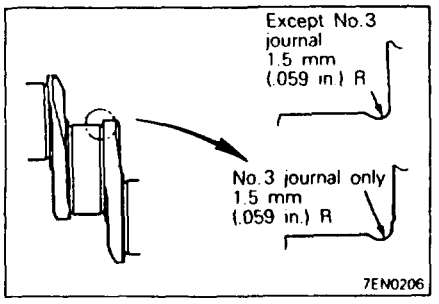
1990 SIGMA V6, Page 11-66





- **OIL CLEARANCE MEASUREMENT**

(1) To check the oil clearance, measure the outside diameter of the crankshaft journal and the crank pin and the inside diameter of the bearing. The clearance can be obtained by calculating the difference between the measured outside and inside diameters.

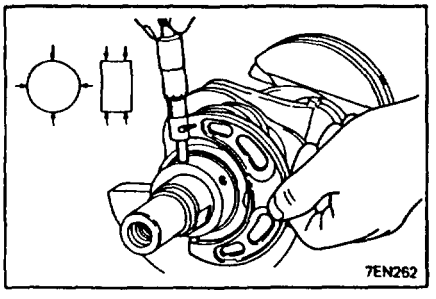
Standard value:

Oil clearance	
Crankshaft main bearing	**0.020–0.048 mm (.0008–.0019 in.)**
Connecting rod bearing	**0.016–0.046 mm (.0006–.0018 in.)**

(2) If the gap (oil clearance) exceeds the limit, replace the bearing, and crankshaft if necessary, ~~or, undersize machine the crankshaft and replace the bearing with the undersized type.~~ ← DELETED

(3) ~~When grinding the crankshaft to under-size, take note of the R dimensions of the fillets of the journal and pin area.~~

1990 MONTERO, Page 11-101



- **CRANKSHAFT**

(1) Check the crankshaft journals and pins for damage, uneven wear and cranks. Also check oil holes for clogging. Correct or replace any defective part.

(2) Inspect out-of-roundness and taper of crankshaft journal and pin.

Standard value

Crankshaft journal O.D. : 60 mm (2.36 in.)
Crank pin O.D. : 50 mm (1.97 in.)

Limit

Out-of-roundness of journal and pin : 0.03 mm (.0012 in.)
Taper of journal and pin : ~~0.05 mm (.0002 in.)~~

CORRECTED 0.005